

What is claimed is:

1. A connection assembly for connecting first and second components so as to promote electrical isolation therebetween comprising first and second members adapted to be connected to said first and second components and a dielectric member situated between said first and second members.

2. A connection assembly in accordance with claim 1, wherein said first component is at a first electrical potential and wherein said second component is at a second electrical potential.

3. A connection assembly in accordance with claim 2, wherein said first component is a pipe and said second component is a pipe.

4. A connection assembly in accordance with claim 1, wherein each of said first and second members includes a through opening and said dielectric member includes a through opening, said through openings of said first and second members and said dielectric member being such as to allow passage through the through opening of one of the first and second members, through the through opening of the dielectric member, and then through the through opening of the other of the first and second members.

5. A connection assembly in accordance with claim 4, wherein the through opening of said dielectric member is smaller than the through openings of said first and second members, whereby a part of the dielectric member overlaps the region of the through opening of said first member and a part of the dielectric member overlaps the region of the through opening of the second member.

6. A connection assembly in accordance with claim 5, wherein the outer extent of the dielectric member extends outward of the outer extent of the first member and outward of the outer extent of the second member.

7. A connection assembly in accordance with claim 6, wherein: each of said first and second members has first and second opposing surfaces, an outer surface connecting the outer peripheries of said first and second opposing surfaces, and the through opening of each of said first and second members extends between the first and second surfaces of that member; said dielectric member has first and second surfaces and the through opening of said dielectric member extends between the first and second surfaces of the dielectric member; and the first surface of said dielectric member faces the first surface of one of said first and second members and the second surface of said dielectric member faces the first surface of the other of said first and second members.

8. A connection assembly in accordance with claim 7, wherein the first surface of each of said first and second members includes a raised sealing face outward of the through opening of that member; and the first surface of said dielectric member outward of the through opening of the dielectric member abuts a part of the raised sealing face on the first surface of said one of said first and second members and the second surface of the dielectric member outward of the through opening of the dielectric member abuts a part of the raised sealing face on the first surface of the other of said first and second members.

9. A connection assembly in accordance with claim 8, wherein said parts of said raised sealing faces of said first surfaces of said first and second members are coated with a dielectric coating.

10. A connection assembly in accordance with claim 9, wherein said coating on said parts of said raised sealing faces of said first surfaces of said first and second members is polished.

11. A connection assembly in accordance with 9, wherein the through opening of each of said first and second members is coated with a dielectric material starting at a location adjacent

said first surface of that member and ending at a second location which is a preselected distance from said first location and short of said second surface of that member.

12. A connection assembly in accordance with claim 11, wherein the first surface of each of said first and second members is coated with a dielectric material.

13. A connection assembly in accordance with claim 12, wherein the outer surface of each of said first and second members is coated with a dielectric material.

14. A connection assembly in accordance with claim 8, wherein each of said first and second members includes a weld-neck on the second surface of that member outward of the through opening of that member.

15. A connection assembly in accordance with claim 14, wherein the second surface of each of said first and second members is coated with a dielectric material short of a part of the weld neck of that surface adjacent the through opening of that member.

16. A connection assembly in accordance with claim 15, wherein: said parts of said raised sealing faces of said first surfaces of said first and second members are coated with a dielectric coating; the through opening of each of said first and second members is coated with a dielectric material starting at a location adjacent said first surface of that member and ending at a second location which is a preselected distance from said first location and short of said second surface of that member; the first surface of each of said first and second members is coated with a dielectric material; and the outer surface of each of said first and second members is coated with a dielectric material.

17. A connection assembly in accordance with claim 16, wherein each of said first and second members is cylindrical in shape, said dielectric member is disk shaped, said through openings of said first and second members are centrally disposed and circular in cross section, and

the through opening of said dielectric member is centrally disposed, aligned with the through openings of said first and second members and of circular cross section less than the circular cross section of said through openings of said first and second members.

18. A connection assembly in accordance with claim 17, wherein said first and second members are each a like flange.

19. A connection assembly in accordance with claim 18, wherein each of said first and second members is an ASME slip-on flange.

20. A connection assembly in accordance with claim 16, wherein: said dielectric member comprises a mica material; and said dielectric coating comprises a multi-layer graded ceramic coating.

21. A connection assembly in accordance with claim 18, wherein said dielectric coating comprises a first layer comprising NiCrAlY, a second layer comprising a mixture of NiCrAlY and Al₂O₃ and a third layer comprising Al₂O₃.

22. A connection assembly in accordance with claim 14, further comprising a fastening assembly for fastening said first and second members and said dielectric member together as a unit.

23. A connection assembly in accordance with claim 21, wherein parts of said fastening assembly include a dielectric material.

24. A connection assembly in accordance with claim 22, wherein: each of said first and second members has one or more a second through openings extending from the first surface to the second surface of that member; said dielectric member includes one or more second through openings extending from the first surface to the second surface of the dielectric member; each of the second through openings in said first member has a corresponding second through opening in said second member and the corresponding through openings in said first and second members align

with a second through opening in said dielectric member; and said fastening assembly includes one or more fastening units, each of said fastening units coupling with corresponding second through openings in the first and second members and the aligned second through opening in said dielectric member.

25. A connection assembly in accordance with claim 24, wherein each of said fastening units includes a dielectric tube extending through the corresponding second through openings in the first and second members and the aligned second through opening in said dielectric member coupling with that fastening unit.

26. A connection assembly in accordance with claim 25, wherein each of said fastening units further includes a bolt, a first dielectric washer, a second dielectric washer, and a securing member for securing said bolt.

27. A connection assembly in accordance with claim 26, wherein for each of the fastening units: the bolt passes through the dielectric tube; the first dielectric washer is located at the head end of the bolt adjacent the second surface of one of said first and second members; and the second dielectric washer is located at the threaded end of the bolt adjacent the second surface of the other of said first and second members.

28. A connection assembly in accordance with claim 27, wherein for each of the fastening units the dielectric tube protrudes into the through opening in each of said first and second dielectric washers.

29. A connection assembly in accordance with claim 28, wherein each of the fastening units further comprises: at least one metallic washer located at the head end of the bolt of that fastening unit outward of the first dielectric washer of that fastening unit; at least one metallic

washer located at the threaded end of the bolt of that fastening unit outward of the second dielectric washer of that fastening unit.

30. A connection assembly in accordance with claim 28, wherein: said parts of said raised sealing faces of said first surfaces of said first and second members are coated with a dielectric coating; the through opening of each of said first and second members is coated with a dielectric material starting at a location adjacent said first surface of that member and ending at a second location which is a preselected distance from said first location and short of said second surface of that member; the first surface of each of said first and second members is coated with a dielectric material; the outer surface of each of said first and second members is coated with a dielectric material; the second surface of each of said first and second members is coated with a dielectric material short of a part of the weld neck of that surface adjacent the through opening of that member; and said second through openings of said first and second members are coated with a dielectric material.

31. A connection assembly in accordance with claim 30, wherein each of said first and second members is cylindrical in shape, said dielectric member is disk shaped, said through openings of said first and second members are centrally disposed and circular in cross section, and the through opening of said dielectric member is centrally disposed, aligned with the through openings of said first and second members and of circular cross section less than the circular cross section of said through openings of said first and second members.

32. A connection assembly in accordance with claim 31, wherein: said dielectric member comprises a mica material; and said dielectric coating comprises a multi-layer graded ceramic coating.

33. A connection assembly in accordance with claim 14, wherein said fastening assembly comprises a V-band clamp.
34. A connection assembly in accordance with claim 1, further comprising a fastening assembly for fastening said first and second members and said dielectric member together as a unit.
35. A connection assembly in accordance with claim 34 wherein said fastening assembly comprises one of a bolt assembly and a V-band clamp.
36. A connection assembly in accordance with claim 34, wherein preslected parts of said first and second members are coated with a dielectric material and preselected parts of said connection assembly comprise a dielectric material.
37. A fuel cell stack assembly comprising:
- a fuel cell stack;
 - at least a first pipe connected to said fuel-cell stack;
 - a second pipe; and
- a connection assembly for connecting said first and second pipes so as to promote electrical isolation therebetween comprising: first and second members connected to said first and second pipes and a dielectric member situated between said first and second members.
38. A fuel-cell stack assembly in accordance with claim 37, wherein each of said first and second members includes a through opening and said dielectric member includes a through opening, said through openings of said first and second members and said dielectric member being such as to allow passage through the through opening of one of the first and second members, through the through opening of the dielectric member, and then through the through opening of the other of the first and second members.

39. A fuel-cell stack assembly in accordance with claim 38, wherein the through opening of said dielectric member is smaller than the through openings of said first and second members, whereby a part of the dielectric member overlaps the region of the through opening of said first member and a part of the dielectric member overlaps the region of the through opening of the second member.

40. A fuel-cell stack assembly in accordance with claim 39, wherein the outer extent of the dielectric member extends outward of the outer extent of the first member and outward of the outer extent of the second member.

41. A fuel-cell stack assembly in accordance with claim 40, wherein: each of said first and second members has first and second opposing surfaces, an outer surface connecting the outer peripheries of said first and second opposing surfaces, and the through opening of each of said first and second members extends between the first and second surfaces of that member; said dielectric member has first and second surfaces and the through opening of said dielectric member extends between the first and second surfaces of the dielectric member; and the first surface of said dielectric member faces the first surface of one of said first and second members and the second surface of said dielectric member faces the first surface of the other of said first and second members.

42. A fuel-cell stack assembly in accordance with claim 41, wherein the first surface of each of said first and second members includes a raised sealing face outward of the through opening of that member; and the first surface of said dielectric member outward of the through opening of the dielectric member abuts a part of the raised sealing face on the first surface of said one of said first and second members and the second surface of the dielectric member outward of the through

opening of the dielectric member abuts a part of the raised sealing face on the first surface of the other of said first and second members.

43. A fuel-cell stack assembly in accordance with claim 42, wherein each of said first and second members includes a weld-neck on the second surface of that member outward of the through opening of that member.

44. A fuel-cell stack assembly in accordance with claim 43, wherein said connection assembly further comprises a fastening assembly for fastening said first and second members and said dielectric member together as a unit.

45. A fuel-cell stack assembly in accordance with claim 44, wherein: each of said first and second members has one or more a second through openings extending from the first surface to the second surface of that member; said dielectric member includes one or more second through openings extending from the first surface to the second surface of the dielectric member; each of the second through openings in said first member has a corresponding second through opening in said second member and the corresponding through openings in said first and second members align with a second through opening in said dielectric member; and said fastening assembly includes one or more fastening units, each of said fastening units having a dielectric tube extending through corresponding second through openings in the first and second members and the aligned second through opening in said dielectric member.

46. A fuel-cell stack assembly in accordance with claim 45, wherein:
each of said fastening units further includes a bolt, a first dielectric washer, a second dielectric washer, and a securing member for securing said bolt; and
wherein for each of the fastening units: the bolt passes through the dielectric tube;

the first dielectric washer is located at the head end of the bolt adjacent the second surface of one of said first and second members; and the second dielectric washer is located at the threaded end of the bolt adjacent the second surface of the other of said first and second members.

47. A fuel-cell stack assembly in accordance with claim 46, wherein for each of the fastening units the dielectric tube protrudes into the through opening in each of said first and second dielectric washers.

48. A fuel-cell stack assembly in accordance with claim 47, wherein each of the fastening units further comprises: at least one metallic washer located at the head end of the bolt of that fastening unit outward of the first dielectric washer of that fastening unit; at least one metallic washer located at the threaded end of the bolt of that fastening unit outward of the second dielectric washer of that fastening unit.

49. A fuel-cell stack assembly in accordance with claim 46, wherein: said parts of said raised sealing faces of said first surfaces of said first and second members are coated with a dielectric coating; the through opening of each of said first and second members is coated with a dielectric material starting at a location adjacent said first surface of that member and ending at a second location which is a preselected distance from said first location and short of said second surface of that member; the first surface of each of said first and second members is coated with a dielectric material; the outer surface of each of said first and second members is coated with a dielectric material; the second surface of each of said first and second members is coated with a dielectric material short of a part of the weld neck of that surface adjacent the through opening of that member; and said second through openings of said first and second members are coated with a dielectric material.

50. A fuel-cell stack assembly in accordance with claim 49, wherein each of said first and second members is cylindrical in shape, said dielectric member is disk shaped, said through openings of said first and second members are centrally disposed and circular in cross section, and the through opening of said dielectric member is centrally disposed, aligned with the through openings of said first and second members and of circular cross section less than the circular cross section of said through openings of said first and second members.

51. A fuel-cell stack assembly in accordance with claim 50, wherein said first and second members are each a like flange.

52. A fuel-cell stack assembly in accordance with claim 51, wherein each of said first and second members is an ASME slip-on flange.

53. A fuel-cell stack assembly in accordance with claim 48, wherein: said dielectric member comprises a mica material; and said dielectric coating comprises a multi-layer graded ceramic coating.

54. A fuel cell stack assembly in accordance with claim 53, wherein said dielectric coating comprises a first layer comprising NiCrAlY, a second layer comprising a mixture of NiCrAlY and Al₂O₃ and a third layer comprising Al₂O₃.

55. A fuel cell stack assembly in accordance with claim 49, wherein said coating on said parts of said raised sealing faces of said first surfaces of said first and second members is polished.

56. A fuel cell stack assembly in accordance with claim 44, wherein said fastening assembly comprises a V-band clamp.

57. A fuel cell stack assembly in accordance with claim 37, further comprising a vessel surrounding said fuel cell stack and through which said second pipe extends.

58. A fuel cell stack assembly in accordance with claim 37, further comprising a fastening assembly for fastening said first and second members and said dielectric member together as a unit.

59. A fuel cell stack assembly in accordance with claim 58, wherein said fastening assembly comprises one of a bolt assembly and a V-band clamp.

60. A fuel cell stack assembly in accordance with claim 59, wherein preslected parts of said first and second members are coated with a dielectric material and preselected parts of said connection assembly comprise a dielectric material.